Appendix D.

1 Bycatch Practicability Analysis (BPA)

1.1 Population Effects for the Bycatch Species

Background

In 2008, a stock assessment for red snapper indicated the red snapper stock was overfished and undergoing overfishing (Southeast Data, Assessment, and Review (SEDAR) 15; 2008a). Consequently, an interim rule was published on December 4, 2009 (NOAA's National Marine Fisheries Service (NMFS) 2010), which prohibited harvest and possession of red snapper beginning on January 4, 2010. That rule was extended for 186 days. Amendment 17A to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region (Snapper Grouper FMP) (Amendment 17A; SAFMC 2010a), effective December 3, 2010, continued the harvest and possession prohibition of red snapper to end overfishing and also implemented a rebuilding plan. **Appendix R** of Amendment 17A contains the BPA conducted for that amendment, and is incorporated herein by reference. At their June 2012 meeting, the South Atlantic Fishery Management Council (South Atlantic Council) reviewed red snapper discard mortality estimates and compared them to the 2012 acceptable biological catch (ABC) from the rebuilding projection. The estimated mortalities for 2012 are less than the ABC for 2012 suggesting some minimal level of harvest of red snapper can occur without negatively affecting the stock (**Appendix B**). As a result, the South Atlantic Council recommended reopening red snapper to a small amount of harvest in 2012.

Harvest of red snapper in federal waters has been prohibited since January 4, 2010. There has been some very small harvest of red snapper in Florida state waters since they did not adopt compatible regulations. However, most of the mortality, in the form of dead discards, has occurred as incidental catch of red snapper from fishermen targeting co-occurring species. Amendment 17A indicates the top co-occurring species with red snapper are vermilion snapper, gag, scamp, greater amberjack, gray triggerfish, black sea bass, and red grouper. The Southeast Fisheries Science Center (SEFSC) has provided a report on the level of harvest and dead discards of red snapper in 2010 and 2011, which is contained in **Appendix B**.

The directed commercial fishery top co-occurring species with red snapper (vermilion snapper, gag, scamp, greater amberjack, gray triggerfish, black sea bass, and red grouper) is executed primarily with hook and line gear (Table 1). Table 1 from **Appendix R** of the Amendment 17A BPA indicates red snapper were also taken primarily with hook and line gear (93%) during 2005-2008 before the harvest prohibition. Black sea bass are predominantly taken with pots.

Table 1. Mean percentage of commercial landings by gear (2010-2011).

Species	Diving	Hook&Line	Longline	Pot	Other
Gag	25.49%	74.47%	0.02%	0.04%	0.00%
Black sea bass	0.08%	12.58%	0.03%	87.21%	0.11%
Vermilion snapper	0.00%	99.97%	0.00%	0.04%	0.00%
Red grouper	2.86%	97.08%	0.01%	0.07%	0.00%
Scamp	11.97%	88.03%	0.01%	0.00%	0.00%
Greater amberjack	6.44%	93.34%	0.21%	0.00%	0.02%
Gray triggerfish	1.70%	93.79%	2.52%	1.56%	0.44%

Source: NOAA's National Marine Fisheries Service (NMFS) Southeast Fisheries Science Center (SEFSC) commercial logbook (April 2012).

During 2010 and 2011, black sea bass were most abundantly captured by the recreational sector, and gray triggerfish landings were evenly divided between the commercial and recreational sectors (Table 2). The commercial sector dominated landings of other species, which commonly occur with red snapper. **Appendix R** from Amendment 17A indicates the recreational sector took approximately 83% of the red snapper landings during 2005-2008.

Table 2. Mean commercial and recreational landings (pounds whole weight) during 2010-2011. Commercial landings include all of Monroe County, Florida; MRFSS landings do not include Monroe County, Florida; Headboat landings include Monroe County, Florida for Atlantic-based vessels.

Species	Headboat	MRFSS	Recreational	Commercial	Percent Recreational	Percent Commercial
Gag	31,241	168,256	199,497	425,328	32%	68%
Black sea bass	260,900	503,973	764,873	400,080	66%	34%
Vermilion snapper	160,467	92,584	253,050	929,001	21%	79%
Red grouper	9,836	97,420	107,256	254,231	30%	70%
Scamp	21,300	34,960	56,261	183,007	24%	76%
Greater amberjack	55,429	609,787	665,216	947,443	41%	59%
Gray triggerfish	139,080	336,044	475,124	423,208	53%	47%

Source: SEFSC commercial annual catch limit (ACL) data (July 2012);
Recreational ACL data (July 2012).

Commercial Sector

During 2010 and 2011, approximately 20% of snapper grouper permitted vessels from the Gulf of Mexico and South Atlantic were randomly selected to fill out supplementary logbooks. The

average number of trips per year during 2010 and 2011 was 21,318; and fishermen spent an average of 1.66 days at sea per trip (Table 3).

Table 3. Snapper grouper fishery effort for South Atlantic.

Year	Trips	Days	Days per Trip
2010	13,387	22,347	1.67
2011	12,253	20,289	1.66
Mean	12,820	21,318	1.66

Source: NMFS SEFSC logbook program.

Among red snapper and co-occurring species during 2010-2011, the average percentage of trips that reported discards was greatest for vermilion snapper and red snapper (25% and 24%,respectively), followed by black sea bass (20%), scamp (13%), and gag (12%) (Table 4). Species with the greatest number of individuals discarded during 2010-2011 were vermilion snapper (44,155), red snapper (41,106), and black sea bass (32,548) (Table 4).

Since the discard logbook database represents a sample, data were expanded to estimate the number of discarded fish (Table 4). The formula used for expansion was: "discard per unit effort from discard logbook database * total effort from commercial logbook." Release mortality estimates for the commercial sector compiled from the most recent stock assessments (as available) using SEFSC's SEDAR process are: 48% red snapper (SEDAR 24; 2010b); 40% gag (SEDAR 10; 2006b); 1% black sea bass (SEDAR 25; 2011); 38% vermilion snapper (SEDAR 17; 2008b); 20% red grouper and 20% black grouper (SEDAR 19; 2010a); 20% greater amberjack (SEDAR 15; 2008a); and 0% gray triggerfish (Gulf of Mexico SEDAR 9; 2006a) (Table 4). Dead discards were estimated by applying the release mortality rates to the total discards. Discard mortality was highest for red snapper (19,731), followed by vermilion snapper (16,779) (Table 4). See the "Finfish Bycatch Mortality" and "Practicability of Management Measures in Directed Fisheries Relative to their Impact on Bycatch and Bycatch Mortality" sections of this BPA for more details.

Table 4. Percentage of trips that discarded species; and expanded commercial discards of red snapper and co-occurring species from 2010-2011.

Species	Percentage of trips that discarded species	Total discards	Release Mortality	Dead discards
Red snapper	24.17%	41,106	48%	19,731*
Gag	12.35%	7,913	40%	3,165
Black sea bass	20.43%	32,548	1%	325
Vermilion snapper	24.99%	44,155	38%	16,779
Red grouper	7.47%	2,447	20%	489
Scamp	13.10%	1,416	Unknown	Unknown
Greater Amberjack	6.11%	3,164	20%	633
Gray triggerfish	7.66%	1,845	0%	0

Note: Computed using mean discard rates (2010-2011) from commercial discard logbook applied to overall commercial effort reported to commercial logbook. ***Appendix B** (SEFSC Report, May 2012).

Recreational Sector

For the recreational fishery, estimates of the number of recreational discards are available from Marine Recreational Fisheries Statistical Survey (MRFSS) and the NMFS headboat survey. The MRFSS system classifies recreational catch into three categories:

- Type A - Fishes that were caught, landed whole, and available for identification and enumeration by the interviewers.
- Type B - Fishes that were caught but were either not kept or not available for identification:
    - Type B1 - Fishes that were caught and filleted, released dead, given away, or disposed of in some way other than Types A or B2.
    - Type B2 - Fishes that were caught and released alive.

Recreational harvest for red snapper co-occurring species, was greatest for black sea bass, followed by vermilion snapper, gray triggerfish, and gag (Table 5). There were differences in the amount and variety of species harvested by the private recreational sector and the "for-hire" sectors (charterboats/headboats). During 2010 and 2011, 90% black sea bass, 89% black grouper, and 84% gag were discarded by the private recreational sector (Table 5). During the same period, 87% red grouper and 67% black sea bass were released by fishermen on charterboats, versus 88% red grouper, 83% black grouper, and 68% black sea bass by fishermen on headboats (Table 5).

Release mortality estimates for the recreational sector compiled from the most recent stock assessments using data from SEDAR stock assessments (as available) are: 25% gag (SEDAR 10; 2006b); 7% black sea bass (SEDAR 25; 2011); 38% vermilion snapper (SEDAR 17; 2008b); 20% red grouper and 20% black grouper (SEDAR 19; 2010a); 20% greater amberjack (SEDAR 15; 2008a); and 0% gray triggerfish (Gulf of Mexico SEDAR 9; 2006a) (Table 5). Dead discards were estimated by applying the release mortality rates to the total discards. In 2010 and 2011, discard mortality was highest for black sea bass (207,156), vermilion snapper (19,425), and gag (19,136) for the private recreational sector (Table 5). For the "for-hire" sector (charterboats/headboats), discard mortality was highest for black sea bass (13,051/35,426), followed by vermilion snapper (6,464/35,228), and red grouper (1,381/2,099) (Table 5). Discard mortality was zero for gray triggerfish in 2010 and 2011, for both the private recreational, and "for-hire" sectors (Table 5).

The SEFSC's May 2012 report (**Appendix B**) shows red snapper discard mortalities in the private recreational sector decreasing from 31,561 fish in 2010, to 16,156 fish in 2011. Conversely, the same report reveals red snapper discard mortalities in the "for-hire" sector (charterboats/headboats) increasing from 20,569 fish in 2010, to 22,131 fish in 2011. Release mortality rates for these two sectors are similar, 41% for the "for-hire" sector, and 39% for the private recreational sector (SEDAR 24; 2010b).

Table 5. Mean number (expanded) of MRFSS private, and charterboat and headboat recreational harvests (A+B1) and discards (B2) for the South Atlantic from 2010-2011.

	Private						Charterboat						Headboat					
Species	Total	A+B1	B2	Percent B2	Release Mortality	Dead Discards	Total	A+B1	B2	Percent B2	Release Mortality	Dead Discards	Total	A+B1	B2	% B2	Release Mortality	Dead Discards
Gag	90,715	14,170	76,545	84%	25%	19,136	3,064	1,795	1,269	41%	25%	317	7,295	2,957	4,339	59%	25%	1,085
Black sea bass	3,292,457	333,083	2,959,374	90%	7%	207,156	279,515	93,069	186,446	67%	7%	13,051	744,708	238,625	506,084	68%	7%	35,426
Vermilion snapper	98,756	47,637	51,119	52%	38%	19,425	45,621	28,610	17,012	37%	38%	6,464	228,610	135,904	92,707	41%	38%	35,228
Red grouper	62,765	6,963	55,802	89%	20%	11,160	7,900	996	6,904	87%	20%	1,381	11,914	1,421	10,493	88%	20%	2,099
Black grouper	5,765	2,209	3,556	62%	20%	711	451	253	198	44%	20%	40	1,841	315	1,527	83%	20%	305
Scamp	5,912	2,533	3,379	57%	25%	845	2,774	1,922	852	31%	25%	213	4,963	2,642	2,321	47%	25%	580
Greater amberjack	38,215	18,152	20,063	53%	20%	4,013	14,100	11,366	2,734	19%	20%	547	4,403	2,821	1,582	36%	20%	316
Gray triggerfish	180,375	99,995	80,380	45%	0%	0	44,982	39,513	5,469	12%	0%	0	76,475	61,082	15,393	20%	0%	0

Source: SEFSC Recreational ACL Dataset (July2012), Headboat CRNF files (expanded; July 2012).
Note: The use of MRFSS data has been recommended until ACLs are recomputed using recalibrated MRFSS>MRIP data.

Finfish Bycatch Mortality

SEDAR 24 (2010b) estimated acute release mortality rates of red snapper to be 48% for the commercial sector, 41% for recreational for-hire sector (charterboats and headboats), and 39% for the private recreational sector, in the South Atlantic. This new stock assessment revised the release mortality estimate of 90% for the commercial sector as reported in SEDAR 15 (2008a). There was no significant difference between the two stock assessments regarding the release mortality of red snapper in the recreational sector, which was 40%, as per the findings in SEDAR 15 (2008a). Diamond and Campbell (2009) reported a delayed mortality rate of 64% off Texas. A study by Burns *et al.* (2004) conducted on headboats off Florida in the Atlantic and Gulf of Mexico found a release mortality of 64% for red snapper. The majority of acute mortalities in this study (capture depth of 9–42 m) were attributed to hooking (49%), whereas barotrauma accounted for 13.5%. An earlier study by Burns *et al.* (2002), also conducted in the Atlantic and Gulf of Mexico, had similar results, as J-hook mortality accounted for 56% of the acute mortalities of red snapper on headboats. Using tagging data and cage studies, Burns *et al.* (2002) determined the depth at which 50% of the released red snapper would die is 43.7 m (143 feet). SEDAR 15 (2008a) indicated red snapper were most often caught at depths of 141 to 190 feet by the recreational sector and 141 to 234 feet by the commercial sector. Rummer and Bennett (2005) reported over 70 different overexpansion injuries related to barotrauma in red snapper, and Wilde (2009) observed reduced survival of this species when vented.

SEDAR 17 (2008b) recommended a release mortality rate for vermilion snapper of 38% for both the commercial and recreational sectors. This was based on a mortality study conducted by Ruderhshausen *et al*. (2007) who estimated release mortality rates of 15% for undersized vermilion snapper. Immediate mortality of vermilion snapper was estimated to be 10% at depths of 25-50 m and delayed mortality was estimated to be 45% at the same depths. Rudershausen *et al.* (2007) indicated minimum size limits are moderately effective in shallower water for vermilion snapper. Previously, SEDAR 2 (2003) estimated a release mortality rate of 40% and 25% for vermilion snapper taken by commercial and recreational fishermen, respectively. Release mortality rates from SEDAR 2 (2003) were based on cage studies conducted by Collins (1996) and Collins *et al*. (1999). Burns *et al*. (2002) suggested that release mortality rates of vermilion snapper could be higher than those estimated from cage studies because cages protect the fish from predators. A higher release mortality rate is supported by low recapture rates of vermilion snapper in tagging studies. Burns *et al*. (2002) estimated a 0.7% recapture rate for 825 tagged vermilion snapper; whereas, recapture rates for red grouper, gag, and red snapper ranged from 3.8% to 6.0% (Burns *et al*. 2002). McGovern and Meister (1999) estimated a 1.6% recapture rate for 3,827 tagged vermilion snapper. Alternatively, recapture rates could be low if population size was very high or tagged fish were unavailable to fishing gear. Harris and Stephen (2005) indicated approximately 50% of released vermilion snapper caught by one commercial fisherman were unable to return to the bottom. Higher recapture rates were estimated for black sea bass (10.2%), gray triggerfish (4.9%), gag (11%), and greater amberjack (15.1%) (McGovern and Meister 1999; McGovern *et al*. 2005). Burns *et al*. (2002) suggested released vermilion snapper did not survive as well as other species due to predation. Vermilion snapper, which do not have air removed from swim bladders, are subjected to predation at the surface of the water. Individuals with a ruptured swim bladder or those that have air removed from the swim bladder are subject to bottom predators, since fish would not be able to join

schools of other vermilion snapper hovering above the bottom (Burns *et al*. 2002). However, Wilde (2009) reports that venting appears to be increasingly harmful for fish captured from deepwater.

SEDAR 10 (2006b) estimated release mortality rates of 40% and 25% for gag taken by commercial and recreational fishermen, respectively. A tagging study conducted by McGovern *et al.* (2005) indicated recapture rates of gag decreased with increasing depth. The decline in recapture rate was attributed to depth related mortality. Assuming there was no depth related mortality at 0 m, McGovern *et al.* (2005) estimated depth related mortality ranged from 14% at 11 – 20 m (36 – 65 feet) to 85% at 71 – 80 m (233 – 262 feet). Similar trends in depth related mortality were provided by a gag tagging study conducted by Burns *et al.* (2002). Overton *et al.* (2008) reported a post-release mortality for gag as 13.3%. Release mortality rates are not known for other shallow water grouper species, but could be similar to gag since they have a similar depth distribution. Rudershausen *et al.* (2007) estimated release mortality rates of 33% for undersized gag taken with J- hooks in depths of 25-50 m off North Carolina. For other gag caught at depths of 25-50 m, no immediate mortality was observed but delayed mortality was estimated to be 49%. McGovern *et al.* (2005) estimated a release mortality rate of 50% at 50 m, which is similar to the findings of Rudershausen *et al.* (2007). Rudershausen *et al.* (2007) concluded minimum size limits are effective for gag in the shallower portions of their depth range.

Release mortality rates were estimated as 20% for black grouper and red grouper taken by recreational fishermen in SEDAR 19 (2010a) during the data workshop. Wilson and Burns (1996) reported potential mortality rates for released red grouper to be low (0 - 14%) as long as the fish were caught from waters shallower than 44 m. SEDAR 15 (2008a) estimated a 20% release mortality rate for greater amberjack. In the Gulf of Mexico, SEDAR 9 (2006a) assume a 0% release mortality rate for gray triggerfish.

Release mortality of black sea bass is considered to be low (7% for the recreational sector and 1% for the commercial sector) (SEDAR 25; 2011) indicating minimum size limits are probably an effective management tool for black sea bass. McGovern and Meister (1999) report a recapture rate of 10.2% for 10,462 that were tagged during 1993-1998 suggesting that survival of released black sea bass is high. Rudershausen *et al.* (2007) reported a sub-legal discard rate of 12% for black sea bass. Collins *et al.* (1999) reported venting of the swim bladder yielded reductions in release mortality of black sea bass, and the benefits of venting increased with capture depth. The same study was analyzed by Wilde (2009) to suggest that venting increased the survival of black sea bass, although this was an exception to the general findings of Wilde's (2009) study.

Practicability of Management Measures in Directed Fisheries Relative to their Impact on Bycatch and Bycatch Mortality

Vermilion snapper, gag, black sea bass, red grouper, black grouper, and red snapper
The snapper grouper fishery represents many species occupying the same location at the same time such as vermilion snapper, scamp, and gag. Fishermen could harvest one of these species when targeting red snapper and may return them to the water as "regulatory discards" (e.g., if the fish is under the size limit) or if undesirable. A portion of the population would not survive. Species with the greatest number of individuals discarded by the commercial sector during 2010-2011 were vermilion snapper (44,155), red snapper (41,106), and black sea bass (32,548) (Table 4). During 2010-2011, 90% black sea bass, 89% black grouper, and 84% gag were discarded by the private recreational sector (Table 5). During the same period, 87% red grouper and 67% black sea bass were released by fishermen on charterboats, versus 88% red grouper, 83% black grouper, and 68% black sea bass by fishermen on headboats (Table 5).

Although fishery management actions can adversely impact non-target species, the proposed action is not anticipated to significantly increase bycatch of snapper-grouper species. As the increase in the red snapper ACL as proposed by the EA is relatively small (13,067 fish) and the seasons would be relatively short, none of the proposed actions are expected to substantially increase overall fishing effort or the spatial and/or temporal distribution of current fishing effort.

Alternative 1 (no action) would retain the red snapper 20-inch total length (TL) minimum size limit; however, the size limit is currently not in effect due to prohibition on the harvest and possession of red snapper. Under **Alternative 1 (no action),** if the season were to reopen, the minimum size limit would be effective. **Alternative 5 (preferred)** would temporarily suspend the size limit. Both alternatives could have adverse effects to the stock by promoting the discarding of fish to the water of which a portion would not survive. Release mortality rates for red snapper range from 39 to 48 percent depending on the fishing sector (SEDAR 24; 2010b). With a minimum size limit (**Alternative 1/no action)**, fishermen may produce "regulatory discards"; these are fish that are returned to the water because they are below the minimum size limit. These fish may be smaller and younger than a 20-inch TL fish and may have been caught in relatively shallow water. Often, discard mortality rates decrease along with depth that the fish was caught.

Fishery managers could produce adverse effects (additional mortality) from both **Alternative 1 (no action)** and **Alternative 5 (preferred)** through "high-grading" behavior. High-grading is a practice of selectively landing fish so that only the best quality (usually largest) fish are brought ashore. For example, recreational fishermen may discard smaller size fish in order to retain a larger, more desirable red snapper. High-grading can result in many dead discards. Fishermen would most likely high-grade less with no size limit (**Preferred Alternative 5**) as fishermen may cease targeting red snapper after harvesting the bag limit. Therefore, suspension of the 20-inch TL minimum size limit (**Alternative 5 Preferred**) could have a greater biological effect than retaining the minimum size limit (**Alternative 1/no action**) if it resulted in fewer fish being discarded.

Preferred Alternative 7 would establish a one per person per day bag limit. Currently, the harvest and possession of red snapper is prohibited and there is no recreational bag limit. There are a number of shortcomings with bag limits similar to the ones previously mentioned concerning size limits. Once the one per person per day bag limit (**Preferred Alternative 7**) is reached, fishermen may retain larger red snapper and throw smaller, dead red snapper back. In addition, the snapper grouper fishery represents many species occupying the same location at the same time such as vermilion snapper, scamp, and gag. Fishermen could continue to target these other co-occurring species and throw back fish that have bag limits such as red snapper, many of which will die. It would be expected that fishermen would still tend to target the largest, most desirable species. However, the bag limit may reduce discards of red snapper and co-occurring species by discouraging the targeting of red snapper after the bag limited is reached.

Overall, the suspension of the minimum size limit **(Preferred Alternative 5)** and establishment of a one fish bag limit **(Preferred Alternative 7**) could reduce the magnitude of dead discards even if high-grading occurs and have an overall positive biological effect on the stock despite the potential for increased discards.

Seasonal closures of both commercial and recreational fisheries implemented by Amendment 16 to the Snapper Grouper FMP (Amendment 16; SAFMC 2009) could also reduce bycatch mortality of red snapper. Expected harvest reductions for red snapper from Amendment 16 in total kill was estimated to be 16.5% (commercial sector), 1.1 to 7.7% (headboat sector), and 2.3% (private/charter sector). A longer spawning seasonal closure could enhance the reproductive potential of grouper stocks. For example Amendment 16 established a January-April spawning season closure for gag, red grouper, black grouper, and shallow water grouper species. Gag are in spawning condition from December through April each year. There is some evidence spawning aggregations may be in place before and after a spawning season (Gilmore and Jones 1992). When aggregated, gag are extremely susceptible to fishing pressure since the locations are often well known by fishermen. Gilmore and Jones (1992) showed that the largest and oldest gag in aggregations are the most aggressive and first to be removed by fishing gear. Since gag change sex, larger and older males can be selectively removed. As a result, a situation could occur where there are not enough males in an aggregation to spawn with the remaining females. Furthermore, the largest most fecund females could also be selectively removed by fishing gear. Therefore, a spawning season closure for all shallow water grouper species would be expected to protect grouper species when they are most vulnerable to capture, reduce bycatch of co-occurring grouper species, increase the percentage of males in grouper populations, enhance reproductive success, and increase the magnitude of recruitment. Other actions in Amendment 16, which could reduce bycatch of snapper grouper species, include a reduction in the recreational bag limit to 1 gag or black grouper (combined) per day within a grouper aggregate bag limit of 3 fish and the establishment of a commercial quota for gag. When the commercial quota is met, all fishing for or possession of shallow water grouper species will be prohibited.

Unobserved mortality due to predation or trauma associated with capture could be substantial (Burns *et al.* 2002; Rummer and Bennett 2005; St. John and Syers 2005; Parker *et al*. 2006; Rudershausen *et al.* 2007; Hannah *et al.* 2008; Diamond and Campbell 2009). Amendment 16 also included actions that required the use of dehooking devices, which could help reduce

bycatch of vermilion snapper, black sea bass, gag, red grouper, black grouper, and red snapper. Dehooking devices can allow fishermen to remove hooks with greater ease and more quickly from snapper grouper species without removing the fish from the water. If a fish does need to be removed from the water, dehookers could still reduce handling time in removing hooks, thus increasing survival (Cooke *et al.* 2001).

In addition to prohibiting the harvest of red snapper, Amendment 17A implemented regulations requiring the use of non-stainless circle hooks north of 28 degrees N. latitude, effective March 2, 2011**.** Circle hooks are generally thought to reduce discard mortality rate for red snapper (SEDAR 7 2005b; Rummer 2007); however, Burns *et al*. (2004) did not observe decreased discard mortality rate when comparing recapture rates of red snapper caught on circle and J-hooks. Rummer (2007), and Diamond and Campbell (2009) found that a greater differential between the surface and bottom temperature caused a higher discard mortality rate for red snapper. Amendment 17B to the Snapper Grouper FMP (Amendment 17B; SAFMC 2010b) established ACLs and accountability measures (AMs) and addressed overfishing for eight species in the snapper grouper management complex currently listed as undergoing overfishing: golden tilefish, snowy grouper, speckled hind, warsaw grouper, black sea bass, gag, red grouper, and vermilion snapper, in addition to black grouper.

The Comprehensive ACL Amendment (SAFMC 2011a) implemented ACLs and AMs for species not undergoing overfishing in four fishery management plans, in addition to other actions such as allocations and establishing annual catch targets for the recreational sector. The Comprehensive ACL Amendment also established additional measures to reduce bycatch in the snapper grouper fishery with the establishment of species complexes based on biological, geographic, economic, taxonomic, technical, social, and ecological factors. ACLs were assigned to these species complexes, and when the ACL for the complex is met or projected to be met, fishing for species included in the entire species complex is prohibited for the fishing year. ACLs and AMs will likely reduce bycatch of target species and species complexes as well as incidentally caught species (i.e. red snapper).

Amendment 18A to the Snapper Grouper FMP (Amendment 18A; SAFMC 2011b) contains measures to limit participation and effort for black sea bass, and does not directly affect red snapper. Amendment 18A established an endorsement program than enables snapper grouper fishermen with a certain catch history to harvest black sea bass with pots. In addition, Amendment 18A includes measures to reduce bycatch in the black sea bass pot fishery, modify the rebuilding strategy, and other necessary changes to management of black sea bass as a result of a 2011 stock assessment (SEDAR-25). Amendment 24 to the Snapper Grouper FMP (Amendment 24; SAFMC 2011c) established a rebuilding plan for red grouper, which is overfished and undergoing overfishing. Amendment 24 also established ACLs and AMs for red grouper, which could help to reduce bycatch of red grouper and co-occurring species such as red snapper.

1.2 Ecological Effects Due to Changes in the Bycatch

The ecological effects of bycatch mortality are the same as fishing mortality from directed fishing efforts. If not properly managed and accounted for, either form of mortality could potentially reduce stock biomass to an unsustainable level.

Overall fishing effort could increase in the commercial and recreational sectors in response to the limited reopening(s) of red snapper, and therefore, increase the potential for bycatch. However, as stated in **Chapter 2** and analyzed in detail in **Chapter 4**, the reopening(s) will be of short duration (see **Chapter 6** for details), and therefore, the ecological effects due to changes in the bycatch would likely be small (see **Appendix C** (SERO 2012b)) for detailed analysis.

1.3 Changes in the Bycatch of Other Fish Species and Resulting Population and Ecosystem Effects

The action in this temporary measure for red snapper through emergency action would allow a limited harvest of red snapper in 2012, after two years of harvest prohibition for the species. Thus, ecological changes could occur in the community structure of reef ecosystems through the proposed action, due to increased fishing pressure on co-occurring species that could be caught as bycatch. These ecological changes could affect the nature and magnitude of bycatch over time. However, as stated in **Chapters 2** and **4**, the allowed harvest of red snapper in 2012 is relatively limited in scope, and changes in the bycatch of other fish species and resulting population and ecosystem effects could be minimal in nature. Quota monitoring by the SEFSC would allow commercial landings to be monitored during and after the 7-day opening(s). Once landings have been reported for the first seven-day commercial opening, the SEFSC would evaluate if the ACL has been met. If the ACL is not met, the season could be reopened for an additional time period. Trip limits could reduce the risk of exceeding the ACL during the 7-day season opening (see **Chapter 4**, **Appendix C** (SERO 2012b), for more details). **Chapter 6** includes details on openings and closures, as well as data collection procedures.

1.4 Effects on Marine Mammals and Birds

Under Section 118 of the Marine Mammal Protection Act (MMPA), NMFS must publish, at least annually, a List of Fisheries (LOF) that places all U.S. commercial fisheries into one of three categories based on the level of incidental serious injury and mortality of marine mammals that occurs in each fishery. Of the gear utilized within the snapper-grouper fishery, only the black sea bass pot is considered to pose an entanglement risk to marine mammals. The southeast U.S. Atlantic black sea bass pot fishery is included in the grouping of the Atlantic mixed species trap/pot fisheries, which the 2012 LOF classifies as a Category II (76 FR 73912; November 26, 2011). Gear types used in these fisheries are determined to have occasional incidental mortality and serious injury of marine mammals. For the South Atlantic snapper grouper fishery, the best available data on protected species interactions are from the SEFSC Supplementary Discard Data Program (SDDP) initiated in July of 200. The SDDP sub-samples 20% of the vessels with an active permit. Since August 2001, only three interactions with marine mammals have been

documented; each was taken by handline gear and each released alive (McCarthy SEFSC database). The longline and hook-and-line gear components of the snapper-grouper in the South Atlantic are classified in the 2012 LOF (76 FR 73912; November 26, 2011) as Category III fisheries.

Although the black sea bass pot fishery can pose an entanglement risk to large whales due to their distribution and occurrence, sperm, fin, sei, and blue whales are unlikely to overlap with the black sea bass pot fishery operated within the snapper grouper fishery since it is executed primarily off North Carolina and South Carolina in waters ranging from 70-120 feet deep (21.3-36.6 meters). There are no known interactions between the black sea bass pot fishery and large whales. NOAA Fisheries Service's biological opinion on the continued operation of the South Atlantic snapper grouper fishery determined the possible adverse effects resulting from the fishery are extremely unlikely.

North Atlantic right and humpback whales may overlap both spatially and temporally with the black sea bass pot fishery. Revisions to the Atlantic Large Whale Take Reduction Plan folded the Atlantic mixed species trap/pot fisheries into the plan (72 FR 57104; October 5, 2007). The new requirements will help further reduce the likelihood of North Atlantic right and humpback whale entanglement in black sea bass pot gear.

The Bermuda petrel and roseate tern occur within the action area. Bermuda petrels are occasionally seen in the waters of the Gulf Stream off the coasts of North and South Carolina during the summer. Sightings are considered rare and only occurring in low numbers (Alsop 2001). Roseate terns occur widely along the Atlantic coast during the summer but in the southeast region, they are found mainly off the Florida Keys (unpublished U.S. Fish and Wildlife Service data). Interaction with fisheries has not been reported as a concern for either of these species.

Fishing effort reductions have the potential to reduce the amount of interactions between the fishery and marine mammals and birds. Although, the Bermuda petrel and roseate tern occur within the action area, these species are not commonly found and neither has been described as associating with vessels or having had interactions with the snapper grouper fishery. Thus, it is believed that the snapper grouper fishery is not likely to negatively affect the Bermuda petrel and the roseate tern.

1.5 Changes in Fishing, Processing, Disposal, and Marketing Costs

Red snapper has been closed since January 2010 for both the commercial and recreational sectors. The action in this temporary measure for red snapper through emergency action would allow a limited harvest of red snapper in 2012. Since red snapper is a desirable species, it is highly likely that all opportunities to harvest this species will be entertained. Therefore, there could be changes to costs associated with the fishing, processing, disposal, and marketing of red snapper. It is likely that all four states (North Carolina, South Carolina, Georgia, and Florida) would be affected by the regulations associated with this action, since fishermen from all the states would be interested in participating in any reopening of the harvest of red snapper.

Additionally, factors such as waterfront property values, availability of less expensive imports, etc. may affect economic decisions made by recreational and commercial fishermen.

The South Atlantic Council has discussed options to enhance current data collection programs in future amendments. This might provide more insight in calculating the changes in fishing, processing, disposal and marketing costs. The states and the SEFSC will work together to collect as much biological information as possible during the limited commercial and recreational openings for red snapper. The emergency action for gathering life history information that may help in assessing the status of the stock in 2014.

1.6 Changes in Fishing Practices and Behavior of Fishermen

Allowing harvest of red snapper could result in a modification of fishing practices by commercial and recreational fishermen, thereby affecting the magnitude of discards. However, as the increase in the red snapper ACL as proposed by the EA is relatively small (13,067 fish) and the seasons would be relatively short, none of the proposed actions are expected to substantially increase overall fishing effort or the spatial and/or temporal distribution of current fishing effort. Red snapper has been closed since January 2010 for both the commercial and recreational sectors. Since red snapper is a desirable species, it is highly likely that all opportunities to harvest this species will be entertained. Predicting changes in angler behavior in response to a reopening is difficult. Many factors can influence fishing activity (see **Chapter 3** for more details) including: fuel costs and trip expenses; weather; changes in regulations; changes in fishing behavior; and conflicting activities (e.g., family activities, sporting events on weekends).

It is difficult to predict how South Atlantic fishermen will respond to a 'derby-style' opening of red snapper. Despite reductions in the fishing season length for Gulf of Mexico red snapper, the average catch-per-day has increased at a linear rate, due in large part to increases in stock abundance, increases in the average size of fish caught, and effort compensation (SERO 2012a). Quota monitoring by the SEFSC would allow commercial landings to be monitored during and after the 7-day opening(s). Once landings have been reported for the first seven-day commercial opening, the SEFSC would evaluate if the ACL has been met. If the ACL is not met, the season could be reopened for an additional time period. Given the potential for large shifts in fishing effort, lower trip limits could reduce the risk of exceeding the ACL during the 7-day season opening (see **Appendix C** (SERO 2012b), for more details).

1.7 Changes in Research, Administration, and Enforcement Costs and Management Effectiveness

Research and monitoring is needed to understand the effectiveness of proposed management measure and their effect on bycatch. Efforts are underway by the states and the SEFSC to enhance data collection activities during the limited opening for red snapper. In addition, approximately 20% of commercial fishermen are asked to fill out discard information in logbooks; however, a greater percentage of fishermen could be selected with emphasis on

individuals that dominate landings. Recreational discards are obtained from the Marine Recreational Information Program (MRIP) and logbooks from the NMFS headboat program. Additional administrative and enforcement efforts will be needed to implement and enforce these regulations.

Additional data collection activities for the recreational sector are being considered in the Comprehensive Ecosystem-Based Amendment 3 that could allow for a better monitoring of snapper grouper bycatch in the future. The use of electronic logbooks could be enhanced to enable fishery managers to obtain information on species composition, size distribution, geographic range, disposition, and depth of fishes that are released. Some observer information has been provided by Marine Fisheries Initiative and Cooperative Research Programs, but more is needed for the snapper grouper fishery.

1.8 Changes in the Economic, Social, or Cultural Value of Fishing Activities and Non-Consumptive Uses of Fishery Resources

Preferred alternatives, including those that are likely to increase or decrease discards could result in social and/or economic impacts as discussed in **Chapter 4** of the EA.

1.9 Changes in the Distribution of Benefits and Costs

The ACL for the commercial and recreational sectors proposed in the temporary rule was specified based on allocations established in the Comprehensive ACL Amendment. Management measures proposed in this temporary rule such as the suspension of the minimum size limit and reduction in the bag limit have the potential to reduce bycatch of red snapper during a limited opening of the recreational and commercial sectors. See earlier section titled, "Practicability of Management Measures in Directed Fisheries Relative to their Impact on Bycatch and Bycatch Mortality", in this BPA for a list of amendments and a summary of actions within them that could help reduce bycatch and discard mortality in the snapper grouper fishery. The extent to which these management measures will increase or decrease the magnitudes of discards is unknown. However, this depends on if fishermen shift effort to other species, seasons, or fisheries and if effort decreases in response to more restrictive management measures as well as changes in community structure and age/size structures that could result from ending overfishing.

1.10 Social Effects

The social effects of all the alternatives, including those most likely to reduce bycatch, are described in **Chapter 4** of the EA.

1.11 Conclusion

This section evaluates the practicability of taking additional action to minimize bycatch and bycatch mortality in the South Atlantic snapper grouper fishery using the ten factors provided at 50 CFR 600.350(d)(3)(i). In summary, management measures proposed in this temporary rule such as the suspension of the minimum size limit and reduction in the bag limit have the potential to reduce bycatch of red snapper during a limited opening of the recreational and commercial sectors. Seasonal closures for snapper grouper species in Amendment 16, as well as the total prohibition for red snapper in Amendment 17A may contribute to decreases in bycatch of red snapper and co-occurring species. The requirement of dehooking devices, a recreational/commercial seasonal closure for gag, reduction of recreational bag limits, and closing all shallow water groupers when a gag quota is met or during a gag seasonal closure specified in Amendment 16 could also help to reduce bycatch. However, this depends on if fishermen shift effort to other species, seasons, or fisheries and if effort decreases in response to more restrictive management measures as well as changes in community structure and age/size structures that could result from ending overfishing. Furthermore, overall fishing effort could decrease in the commercial and recreational sectors in response to more restrictive management measures, thereby reducing the potential for bycatch.

ACLs and AMs established by Amendment 17B and the Comprehensive ACL Amendment could help reduce bycatch by limiting the amount of harvest, and provide for accountability if the ACL is exceeded. Management measures in Amendment 17B limit harvest of co-occurring species (vermilion snapper, gag, scamp, greater amberjack, gray triggerfish, black sea bass, and red grouper), and could help reduce discard mortality of red snapper.

Amendment 18A contains measures to limit participation and effort for black sea bass, which co-occurs with red snapper. In addition, Amendment 18A includes measures to reduce bycatch in the black sea bass pot fishery, modify the rebuilding strategy, and other necessary changes to management of black sea bass as a result of a 2011 stock assessment (SEDAR 25). Amendment 24 specifies ACLs and AMs for red grouper, which could reduce bycatch of red grouper co-occurring species such as red snapper.

The South Atlantic Council is considering actions in future amendments such as a tagging program in Amendment 22 to the Snapper Grouper FMP (Amendment 22) to allow harvest of red snapper as the stock rebuilds. Scoping of Amendment 22 was conducted during January and February 2011. Additionally, a new regulatory amendment is under development to allow for adjustment of allocations and ACLs based on the new landings information from MRIP. Finally, at their June 2012 meeting the South Atlantic Council requested development of a regulatory amendment to adjust management measures for greater amberjack, vermilion snapper, black sea bass, gray triggerfish, and vermilion snapper, which co-occur with red snapper.

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